

Among the many interesting aspects of Schönbein's life and work dealt with in this section is his dislike for organic chemistry already referred to in his correspondence with Faraday. Dr. Kahlbaum, we may add, endorses this opinion with some very strong remarks of his own (pp. 204-205), which will, no doubt, be forgiven by the "Herren Organiker" in view of the very important service to the history of nineteenth century science which he is rendering by these biographical contributions. Then, again, one cannot but be struck by the versatility of Schönbein's genius as revealed by the narration of his connection with journalism. That the illustrious Bâle professor was possessed of great literary power is made clear by his biographer. It is worthy of record that Schönbein attended the Birmingham meeting of the British Association in 1839, and the Cambridge and Southampton meetings in 1845 and 1846; of the first of these he gave an account in his "Reisetagebuch eines deutschen Naturforschers," of which extracts in English were published in the *Athenæum*. As an excellent example of his literary style may be mentioned the charming description of Easter festivities in Germany, written in English to Faraday in 1856. With respect to the literary style and method of publishing his scientific writings, there is a long and interesting critical letter from De la Rive in 1839, in which he reproaches Schönbein for being too diffuse, for writing too much and at too great a length, for introducing too often unverified suppositions, and, in fact, as we should say at the present time, for transferring the contents of his laboratory notebooks to the pages of his published memoirs:—

"C'est une voie tentative, à la tête de laquelle est Faraday dans ce moment, qui publie, publie le journal de ses expériences, aussi voyez le peu d'effet que font ses travaux sur le continent."

This criticism, by the way, is endorsed by Dr. Kahlbaum, who regrets that the Germans, "on account of its foreign origin," should have imitated a style which he characterises as incivility (*Unhöflichkeit*) to the readers.

Enough has been gleaned from this volume to show our readers that as a contribution to the history of the science of the nineteenth century, it is in no way inferior to its predecessors.

R. MELDOLA.

PROFESSOR TAIT'S SCIENTIFIC PAPERS.

Scientific Papers. By Peter Guthrie Tait, M.A., Sec. R.S.E. Vol. ii. Pp. xiv + 500. (Cambridge: At the University Press, 1900.)

PROF. TAIT is to be congratulated on the energy with which this reprint is being pushed forward. The first volume, noticed in *NATURE*, vol. lx. p. 98, is already followed by a second, so that the completion of the work at an early date may be anticipated.

The present instalment contains two considerable experimental investigations; one of these, on the compressibility of water at very high pressures, was suggested by a previous research on the *Challenger* thermometers; for the second, on impact, we are indebted to the author's well-known interest in golf. There is also a very interesting discussion of the cause of the "soaring" flight of a golf ball.

The most important theoretical research consists of a revision of the kinetic theory of gases, from the old standpoint of elastic spheres. All students of this intricate subject will be glad to have Prof. Tait's acute examination of it in the present compact form. It is interesting to note, by the way, the author's frank confession: "I have . . . abstained from reading the details of any investigation (be its author who he may) which seemed to me to be unnecessarily complex. Such a course has, inevitably, certain disadvantages, but its manifest advantages far outweigh them!" Let us hope that no indolent reader will be tempted to turn against Prof. Tait himself a *dictum* which conveys a very salutary warning to authors!

One of the most useful features of this reprint is the number of short papers which to many readers will now become known for the first time. There are also included a few biographical notices, as well as articles from the "Encyclopædia Britannica." In a note to the article on "quaternions" we are told that the sketch of the subject recently given by Prof. Klein in the "Theorie des Kreisels" rests on a misapprehension. This is one disappointment the more for those students who have vainly striven time after time to get a clear notion of what a quaternion really is, and who hoped that they had found at last something like a clear and compact and intelligible account of the matter. If, in spite of the fact that "the grandest characteristic of quaternions is their transparent intelligibility," men like Cayley and Klein are declared to have gone astray, one may be excused for asking whether there may not be something wanting after all in the official presentations of the subject?

The paper on the laws of motion hardly addresses itself to points on which a modern reader would seek enlightenment. Instead, we have verbal questions as to the meaning of "force" and the proper translation of certain phrases of Newton. Are not such questions disposed of once for all by the simple statement that since the time of Newton scientific people have specialised their usage of the word "force"? Although this has not been an unmixed advantage, it is probably now irrevocable. Still, one may reasonably urge that it is hardly fair to take a popular term, used in a great variety of senses, to attribute it for special purposes one and only one of these, and then to denounce as ignorant any one who continues to use it in its former latitude. The scorn, for example, which has been called forth by the term "centrifugal force" has often been most unjust, the physical notions of the users being clear enough, although they were not expressed in the conventional phraseology. The endless discussions which have been inflicted on us as to the meaning of the word "weight," furnish another instance of the trouble which may be wrought by specialists attempting to usurp functions which do not properly belong to them.

The last paper in the volume, on the teaching of natural philosophy, contains matter which probably hardly any one would question. Yet it well deserves reprinting, if only for the passage near the end which speaks of "the fatal objections to the school-teaching of physical science," based on the intrinsic difficulties of the subject, and the maturity of mind required to overcome them. Any one who is aware of the futility and the pedantry of

a good deal that goes on in schools under the name of science-teaching will thank Prof. Tait for this courageous utterance. The mischief is that school-teaching is dominated by examinations, and that the kind of science-teaching which it is possible, and highly desirable, to have in schools does not readily lend itself to examination-tests of the ordinary kind.

The volume is marked by the same beauty and accuracy of printing as the former one. It is intimated that a third volume will complete the work.

HORACE LAMB.

WYATT'S BRITISH BIRDS.

British Birds; with some Notes in reference to their Plumage. By C. W. Wyatt. Coloured Illustrations. (London: William Wesley and Son, 1899.)

WHETHER the beautifully illustrated work on the same subject by the late Lord Lilford leaves room for the present volume and its predecessor, is a question for the publisher rather than for the reviewer to answer; but, if the stream of books on the subject be any criterion, the appetite of the British public for natural histories of the avifauna of their own country seems insatiable. Apart from all this, the present work, of which the first volume was issued in 1897, has high claims on the consideration of the public, the large size (4to.) of the paper on which they are printed permitting the plates to be on a scale of greater magnitude than in the work above-mentioned, while their excellence from an artistic point of view, as well as their apparent fidelity to nature, leaves little or nothing to be desired from the point of view of the connoisseur in animal painting. In too many instances we have either an inartistic but truthful portrait of the creature depicted, or an artistic picture in which details of coloration are sacrificed to the general effect; but in the present case, the happy mean appears to have been attained in these respects. The plates are signed with the initials "C. W. W.," but we are told in the preface that the colouring has been done by the daughters of Dr. Bowdler Sharpe, whose training is a sufficient guarantee for its accuracy.

It must, indeed, be understood that the book stands or falls by the plates, as the letterpress is restricted in the main to details concerning the plumage of the specimens figured, or to generalities relating to seasonal changes of colour, nothing in the way of description being given.

When the scientific names applied to the different species are those of almost universal acceptance, no references to other works are added; but in the case of those where uniformity is by no means general, a reference is made to the synonyms used in standard manuals, such as the fourth edition of "Yarrell." It may be added that the reference to the latter work in the case of the Hen-Harrier appears to have been introduced by mistake, as the nomenclature employed is the same. As regards generic nomenclature, the author adopts a middle course, avoiding the inordinate "splitting" followed by some ornithologists, as he does the excessive "lumping" favoured by others.

The first volume was devoted to the resident Passeres of the British Islands, and as the present commences with

the migratory members of the same order, it will be evident that the author does not confine himself to a strictly systematic arrangement. In excluding the casual visitors, which, in our own opinion, have no right whatever to the title of British Birds, the author differs from the plan followed by some of his brother ornithologists, whose object seems to be to draw up as long a list as possible, without any regard to the facts of geographical distribution. The other groups included in this volume include the Picarians, Owls, Hawks, and Pigeons, so that the Game Birds, Waders, and Water-Birds alone remain for its successor.

As a handsome, and at the same time an accurate, series of volumes for the drawing-table, the work may be heartily commended to all bird-lovers with whom "money is no object."

R. L.

OUR BOOK SHELF.

Our Native [American] Birds, how to protect them, and attract them to our homes. By D. Lange. Pp. x + 162. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1899.)

LEST our readers should be misled into thinking that the present little volume is but another item in the already large literature of British ornithology, we have ventured to indicate its birth-place by a bracketed interpolation in the title.

The author, to whom the love of birds is evidently second nature, starts with the assertion that, with the exception of a few counties, the number of song-birds has of late years been steadily decreasing in the United States, and then proceeds to consider in detail—firstly, how this unfortunate state of things has been brought about, and, secondly, how it may best be remedied. Nor are song-birds alone considered, a certain amount of space being devoted to game-birds (inclusive of the *Anatidae*), many of which have likewise suffered severely.

The fact of the decrease in the former group seems to rest on conclusive evidence; the main causes assigned being lack of suitable nesting-places, want of water and food, the abundance of cats (domestic and feral), the ravages committed by boys, collectors, and plume-hunters, the aggressive habits of the English sparrow, and the use of poison in gardens and farms.

As regards legislative protection, the author wisely leaves this to the various "Audubon Societies," which have been established in the States, and other suitable agencies; devoting his attention mainly how to supply to his feathered friends such objects as are essential to their well-being, and how to guard them from the attacks of their chief foes. As our readers are aware, many towns and villages in the States are located on the open prairie, where the absence of cover renders the birds especially liable to destruction; while even in districts more favoured by nature there seems to be a great tendency to make the gardens of residents as open and bare of shrubbery as possible. Old hollow trees, too, which form the nesting-places of so many species, have likewise been ruthlessly felled, so that the unhappy birds have literally no retreats wherein to hide.

Accordingly, the planting of trees, vines and shrubs (especially kinds which afford good cover and edible berries) is strongly urged, while beds of suitable kinds of flowers, such as gladioli, should be planted to attract humming-birds. For species building in hollow trees, nesting-boxes should be provided in suitable sites; while drinking and bathing vessels should be furnished in the dry season, and abundance of suitable food at all times. The noxious sparrow is to be hustled out of the usurped nesting-places, while coils of barbed wire, or suitable